THE HEMISPHAERIACEAE OF BRITISH GUIANA AND TRINIDAD

F. L. Stevens and H. W. Manter

(with plates xviii–xxi)

The Hemisphaeriaceae, or "fly-speck" fungi, are chiefly tropical and are strictly superficial upon the surface of leaves. They either lack a true mycelium or it is so inconspicuous as to escape observation. The appearance of the flattened, circular, usually blackened thyriothecia (perithecia) on the leaf has led to the popular term "fly-specks." The studies in the present paper are based on material collected by the senior author in British Guiana and Trinidad during the summer of 1922. General observations in regard to the collecting, together with a map of the regions covered, as well as a list of the field numbers with places and dates of collection may be found in a previous paper (10). The original slides, drawings, and specimens upon which these studies are based are deposited in the herbarium of the University of Illinois. The photographs in the present paper are by A.G. Eldridge.

The general typical appearance of the thyriothecia spotting the leaf surface is shown in figs. 1 and 3. The central region of old thyriothecia sometimes falls away, giving the appearance shown in fig. 2. These disclike bodies are easily removed from the leaf, and are readily studied in temporary water mounts, where the fruit body can be cut or crushed to reveal its asci and spores. Light staining with iodine may be advantageous. Permanent mounts of the thyriothecia are easily made by the celloidin method (9). The thyriothecia of the most common group of these fungi are carbonaceous and opaque, except for a narrow peripheral region which is blue-green; others may be brown in color. Old thyriothecia often appear entirely carbonaceous. The extremely variable and beautiful conditions of the spores and asci lend especial interest to the group. The taxonomy of the group is somewhat confused, and some history of the changes it has undergone is important.

The Hemisphaeriaceae are very similar to the Microthyriaceae. The latter is a very large group of some 32 genera (of which *Asterina* alone contains over 100 species), also chiefly tropical in distribution, and likewise possessing disclike, superficial thyriothecia. In fact, the two groups were not distinguished for a long time, both being united under the Microthyriaceae.

Apparently the first attempt to separate the blue-green "fly-specks" from the Microthyriaceae was made by VON HÖHNEL in 1910 (**22**). In commenting upon *Micropeltis applanata*, he pointed out that this species differed from the ordinary species of the Microthyriaceae in that the thyriothecia were not formed as inverse fruit bodies. He accordingly listed *Micropeltis* and *Scolecopeltis* as disc-shaped Sphaeriaceae. In 1912 (**23**), he discarded from *Micropeltis* many of the former species, on the basis of his former distinction between them and the Microthyriaceae. He stated that many of the so-called *Micropeltis* species, especially the smaller forms with radial structure, belong to the Microthyriaceae proper. Before that time 69 species of *Micropeltis* had been described. Of these, VON HÖHNEL retained only 23 as true *Micropeltis* species, and assigned the others to various genera among the Microthyriaceae and lichens.

In 1913 THEISSEN (**16**) established a distinction between the Microthyriaceae and the group represented by *Micropeltis* by erecting a new family, Hemisphaeriaceae, for the latter type; the Microthyriaceae being characterized by inverse and radiate thyriothecia, the Hemisphaeriaceae by non-inverse and non-radiate thyriothecia. Furthermore, THEISSEN united all the species with disc-shaped thyriothecia into a new order, which he named Hemisphaeriales (**16**). In this order, in addition to the previously mentioned families, he included the Trichopeltaceae, which possess disc-shaped thyriothecia but also a vegetative thallus. A key to these families superficial on the host would then be (according to THEISSEN and SYDOW):

Thyriothecial membrane radial
  Thallus thready or lacking.....Microthyriaceae
  Thallus membranous, radial.....Trichopeltaceae
Thyriothecial membrane not radial.....Hemisphaeriaceae

THEISSEN then proceeded to divide the Hemisphaeriaceae into subfamilies based on the structure of the thyriothecial membrane.

The Dictyopeltineae (Dictyopelteae) possess a netlike covering blue-green or blue-black in color, and the Thrausmatopeltineae (Thrausmatopelteae) a pseudo-parenchymatic covering, easily breaking into pieces and yellow to brown-black in color. A third subfamily later named by THEISSEN (17) is Plochmopeltineae, with thyriothecial membrane of meandering, plectenchymatic structure, and with a netlike mycelium without hyphopodia. STEVENS and GUBA have added a fourth subfamily (11), with "thallus that of the Thrausmatopeltineae, asci solitary, naked, without a covering membrane."

Key to subfamilies of Hemisphaeriaceae (modified after THEISSEN and SYDOW):

Thyriothecial membrane open netted, blue-green, without true mycelium ..... Dictyopeltineae Theiss.

Thyriothecial membrane pseudo-parenchymatic, brown, without true mycelium

Asci covered ..... Thrausmatopeltineae Theiss.

Asci naked ..... Gymnopeltineae Stevens and Guba

Thyriothecial membrane meandering-plectenchymatic, mycelium netlike, no hyphopodia ..... Plochmopeltineae Theiss.

The Dictyopeltineae are by far the most common, with *Micropeltis* as perhaps the most common genus. As has been shown, this genus in the past has been overworked as a pigeon hole for many fungi of the general characteristics of the group. Now, however, it has been conveniently divided into a number of genera. THEISSEN'S step in placing all radiate thyriothecia in the Microthyriaceae was perhaps the most valuable delimination.

As early as 1889, SPEGAZZINI (5) established the genus *Scolecopeltis*, which is distinguished from *Micropeltis* chiefly in possessing filiform, many-septate spores which tend to fall apart into their component cells. This distinction is not entirely satisfactory, as it requires an arbitrary decision as to what constitutes a filiform spore. The many-septate condition of the spore is highly variable in spores of more than a few cells. The loose connection between the cells in the spore, considered together with the filiform character, however, makes *Scolecopeltis* quite definitely distinct from *Micropeltis*. The type species of *Scolecopeltis* is aparaphysate. It has seemed best in this paper to erect for all species which otherwise agree with

Scolecopeltis, but which possess paraphyses, a new genus, *Scolecopeltidium*.

The presence or absence of paraphyses seems to be a constant character, and a valid distinction upon which to separate genera. In 1913 SYDOW (**12**) utilized this character to distinguish a new genus, *Micropeltella*, without paraphyses, from *Micropeltis*, the type of which possesses paraphyses. *Micropeltella* at once adopted many of the old species of *Micropeltis*.

When the number of cells in the spores of these fungi is small, it usually is a constant character; hence, spore septation has been used to separate a few genera from *Micropeltis*. Those with 1-celled spores were allotted to *Dictyothrina* by THEISSEN (**16**); 2-celled spores to *Dictyothyrium* by THEISSEN (**14**); and 3-celled spores to *Dictyothyriella* by REHM (**17**). This last genus includes some of the most common members of the group, and numerous previously described *Micropeltis* species. *Dictyopeltis* Theiss. (**16**), with 2-celled spores, is distinct from *Dictyothyrium* in that it has no ostiole, but when ripe the whole thyriothecium breaks away from its rim.

Recently, SPEGAZZINI has separated several genera on the basis of the possession of stellate ostioles instead of the normal circular ostioles. The three genera created on such a basis are:

STELLATE OSTIOLE		ROUND OSTIOLE	
Micropeltidium	separated from	*Micropeltis*	(**6**)
Parapeltella	separated from	*Micropeltella*	(**6**)
Scolecopeltella	separated from	*Scolecopeltis*	(**7**)

It seems somewhat doubtful whether this stellate or round condition of the ostiole is a sufficiently definite character to be of taxonomic value. In all the material observed in the present studies, none of the thyriothecia appeared to possess what could be called a characteristically stellate ostiole. It is true, however, that ostioles become quite irregularly circular, due to a tendency of their borders to fray or slightly split (figs. 55–57). If the very definite stellate condition illustrated by SPEGAZZINI (**6**) is a constant and permanent form, then it may well be considered as a valid and useful distinction. Since no specimens of such a type were seen, these three genera of SPEGAZZINI are accepted and included in the key to the genera of the

Dictyopeltineae. Curiously enough, SPEGAZZINI, in his key to the Dictyopeltineae (7), lists his genus *Parapeltella* as with a round ostiole, and separates it from *Micropeltella* by its clavate spores, a new distinction which hardly seems justified. Since the type description of the genus holds validity, this later discrepancy is doubtless due to an error in the publication of his key.

There appears to be another point of confusion in the consideration of SPEGAZZINI'S genus *Micropeltidium*. As noted, this genus was separated from *Micropeltis* in 1919 only on the basis of its stellate ostiole. In the original description the genus was characterized as with paraphyses, and the type species (*Micropeltis tonduzii*) is densely paraphysate. It seems clear, then, that the presence of paraphyses is a character of the genus, as, indeed, otherwise it would correspond with *Parapeltella*. In 1923, however, SPEGAZZINI (7) seems to describe *Micropeltidium* again as a new genus, and here he points out that it is aparaphysate. The two species listed under it in 1923 are aparaphysate. Accepting the earlier and type descriptions of the genera involved, these two species seem to belong to *Parapeltella*.

This confusion in the conception of *Micropeltidium* has involved also another genus, *Metapeltella*, which SPEGAZZINI named in 1923 (7) in connection with his genus *Micropeltidium*, named at that time. *Metapeltella* is like *Micropeltidium*, except that the spores are clavate with the tip cell much larger. Since the genus is based on SPEGAZZINI'S second *Micropeltidium*, *Metapeltella* is aparaphysate with stellate ostiole. SPEGAZZINI himself remarks that the spores of *Metapeltella* are like those of *Parapeltella*. As has been shown, the second *Micropeltidium* could not be distinguished from SPEGAZZINI'S earlier *Parapeltella*, and this agreement of spore shape makes the identity of the two genera (*Metapeltella* and *Parapeltella*) even more perfect. From a careful study of the descriptions of these genera, it does not seem possible to separate *Metapeltella* from *Parapeltella* (as originally described), while the second *Micropeltidium* is separated from *Parapeltella* only on the basis of its possession of fusoid instead of clavate spores, and from *Micropeltella* only by its stellate ostiole. Whether genera should be separated on such considerations seems doubtful, but as no material of these species or groups was encountered in the

material examined by us, the genera are included in the following key. SPEGAZZINI'S second *Micropeltidium* is designated as *Micropeltidium* no. 2.

One other puzzling point remains in regard to SPEGAZZINI'S genus *Micraspidium*. No reference could be found to this genus except in SPEGAZZINI'S key to the Dictyopeltineae in 1923. According to this key, *Micraspidium* cannot be distinguished from the earlier *Micropeltidium*, which, of course, is not represented in the key except as the second *Micropeltidium* (of different characters). Without knowledge of the type species of *Micraspidium* no definite statement can be made, but it may be significant that if the earlier *Micropeltidium* had been published as *Micraspidium*, most of the seeming contradictions in SPEGAZZINI'S 1923 paper would be cleared up.

A genus, *Micropeltopsis*, described by EARLE[1], introduces a new distinguishing character. *Micropeltopsis* is separated from *Micropeltis* by possessing a white membranous border or halo around the thyriothecia. There are two objections to such a separation. First, the present studies seem to show that the halo, sometimes prominent, may be reduced in old thyriothecia of the same species, and in many cases even when present it can easily be lost in removing the thyriothecia from the leaf. Second, it is a character rarely mentioned in old descriptions, and the whole group would be of uncertain position until re-examined. *Micropeltopsis*, therefore, is not recognized in the following key.

All of these genera of the Dictyopeltineae are characterized by a netlike thyriothecial covering, and also by a blue-green color. THEISSEN in 1913 (**15**) noted this correlation, although the important character is the type of structure. The blue-green color is given by THEISSEN as accompanying all of the Dictyopeltineae known. One form was found in the present studies, however, which clearly possessed a coarse, open netted thyriothecial covering, but was a rich brown. This form is included under the Dictyopeltineae as a new genus, *Theciopeltis*.

[1] SPEGAZZINI (**7**) credits EARLE with describing this genus with the characters noted, but no trace of the original description could be found. The genus is also unknown at the New York Botanical Gardens, where most of the EARLE'S specimens are deposited.

Following generic characters as outlined, a key to the genera of the Dictyopeltineae (based on the key by THEISSEN and SYDOW **19**) is given as follows:

Thyriothecial membrane open netted
Thyriothecial membrane blue-green
Spores 1-celled.....*Dictyothyrina* Theiss.
Spores 2-celled
Ostiole present.....*Dictyothyrium* Theiss.
Ostiole absent.....*Dictyopeltis* Theiss.
Spores 3-celled.....*Dictyothyriella* Rehm
Spores 4 to many-celled
Paraphyses present
Ostiole round.....*Micropeltis* Mont.
Ostiole stellate.....*Micropeltidium* Speg.
Paraphyses absent
Ostiole round.....*Micropeltella* Syd.
Ostiole stellate
Spores clavate.....*Parapeltella* Speg.
Spores fusoid.....*Micropeltidium* no. 2 Speg.
Spores filiform
Paraphyses present.....*Scolecopeltidium* Stevens and Manter
Paraphyses absent
Ostiole round.....*Scolecopeltis* Speg.
Ostiole stellate.....*Scolecopeltella* Speg.
Thyriothecial covering brown.....*Theciopeltis* Stevens and Manter

Each genus represented in the material studied will be considered later, together with keys to the species.

DICTYOTHYRIUM Theiss. Oster. Bot. Zeitschr. **62**:277. 1912

This genus has only a few species. It is clearly separated from *Micropeltis* which it resembles except that it has 2-celled spores. *M. corruscans* Rehm (**3**) is described as having 1-septate spores, so that we consider this species also as *Dictyothyrium*.

Spores clavate.....*D. subcyaneum* (Ellis and Mart.) Theiss.
Spores cylindrical
Paraphyses present
Asci 2-spored.....*D. disporum* Stevens and Manter
Asci with variable number of spores
Epiphyllous
Asci 90 μ in length.....*D. chalybaeum* (Rehm) Theiss.
Asci 125–170 μ.....*D. leucopterum* Syd.
Mostly hypophyllous.....*D. giganteum* Syd.
Paraphyses absent
Asci 8-spored.....*D. corruscans* (Rehm), n. comb.

1. **Dictyothyrium disporum** Stevens and Manter, n. sp. (fig. 8) —Thyriothecia amphigenous, mostly hypophyllous, 535 μ in diameter, margin blue-green; ostiole round, up to 40 μ in diameter; asci obclavate, stipitate, 138×33 μ, always 2-spored; paraphyses filamentous, crooked, copious; spores large, cylindrical, sometimes somewhat pointed at ends, especially when young, obtusely rounded at ends when mature, 1-septate, constricted, cells usually equal, basal cell sometimes slightly longer, spores 70–95×10–12 μ.

On unknown member of the Menispermaceae, British Guiana: Rockstone, July 16, *435*.

This fungus is nearest *D. leucopterum* Syd., but differs from it in being mostly hypophyllous and in always having 2-spored asci. It differs from *D. giganteum* Syd. by having larger and 2-spored asci.

2. DICTYOTHYRIUM GIGANTEUM Syd. Phil. Jour. Sci. **9**:C. 178. 1914

On *Serjania paucidentata*, British Guiana: Kartabo, July 23, *586*.

This fungus agrees with the preceding species in all measurements and in spore septation. It disagrees, however, in a number of characters. Thus, asci were found with 1–3–4–6–8 spores. Great variation was found in the size and appearance of spores in the same ascus. Owing to the small amount of material available, the fungus has been accorded to the species *D. giganteum*, which it most closely resembles. A study of further material, if possible, would perhaps establish it as a new species.

3. DICTYOTHYRIUM LEUCOPTERUM Syd. Ann. Myc. **14**:93. 1916

On *Eperua* sp., British Guiana: Wismar, July 14, *271*.

DICTYOTHYRIELLA Rehm, Broteria **12**:92. 1914

Dictyothyriella is perhaps of more frequent occurrence than any other genus in the group. Its 2-septate spores are quite constant, and separate it from *Micropeltis*. BEELI (1) does not seem to recognize *Dictyothyriella*, as he describes two *Micropeltis* species (*M. wildemanii* and *M. dubia*) with 2-septate spores. We are including these species in the key under *Dictyothyriella*. The genus is also apparently accidently omitted from SPEGAZZINI's key to the *Dictyopeltineae* in 1923.

Members of the same species of *Dictyothyriella* seem to grow on a great variety of hosts. Not only is the same species found on widely different hosts, but the same species appears to occur in widely differ-

ent parts of the world. This condition of host relationship and distribution seems to be characteristic of the Hemisphaeriaceae in general. While there may be biological specialization among the "fly-specks," as the fact that they are not found indiscriminately on all leaves in their neighborhood seems to indicate, it is not in many cases manifested morphologically.

Extreme morphological variation is often found within a single species of *Dictyothyriella*. As a result of this variation it is often very difficult to separate species, and some species necessarily embrace a large range of characters, and thus many examples of these species are found. For example, *D. heterosperma* has been found to exhibit nearly all possible variations, even within a single thyriothecium.

Species have been separated as distinctly as possible in the key, but it should be remembered that this key, as well as other keys in this paper, is sometimes forced to resort to characters of rather weak significance. The keys are entirely artificial. It is hoped that they will prove a convenient guide in determining species, but they cannot be considered as ultimate, nor even as bringing out the most important differences in every case. In a few cases no distinction could be discerned between two species from the descriptions, which are frequently inadequate. In such cases the two species are listed together.

Paraphyses lacking
  Asci 8-spored
    Spores not constricted ..... *D. microsperma* (Syd.), n. comb.
    Spores only slightly constricted ..... *D. wildemanii* (Beeli), n. comb.
    Spores strongly constricted
      Asci 60–75 μ long ..... *D. harmsiana* (P. Henn.), n. comb.
      Asci 85–120 μ long ..... *D. camarinensis* (Syd.), n. comb.
  Asci 2–4–8-spored
    Spores rarely 3-septate, 65–75 μ ..... *D. megasperma* (Syd.), n. comb.
    Spores rarely 1-septate, 36–48 μ ..... *D. dubia* (Beeli), n. comb.
Paraphyses present
  Asci 8-spored
    Spores not over 20 μ
      Hypophyllous ..... *D. biseptata* (v. Höhn.) Theiss.
      Epiphyllous
        Spores obclavate ..... *D. microspora* (Speg.) Theiss.
        Spores clavate or oblong
          Asci 30–35 μ ..... *D. bauhiniae* (Rehm), n. comb.
          Asci 45–55 μ ..... *D. trewiae* Syd.
                D. semecarpi (Syd.), n. comb

Spores 35 μ in length.....*D. trimera* (Sacc.), n. comb.
Spores 38–62 μ in length.....*D. macromera* (Syd.), n. comb.
Asci 4-spored
Tip cell of spore pointed.....*D. coerulescens* (Rehm), n. comb.
Asci with variable number of spores
Tip cell of spore pointed
Asci usually 4 or 6-spored, rarely 2-spored
Spores 30–60 μ.....*D. guianensis* Stevens and Manter
Asci usually 2-spored, sometimes 4.*D. philodendri* Stevens and Manter
Asci 4–8-spored, usually 8, rarely 2
Spores 50–72 μ.....*D. heterosperma* Syd.
Tip cell of spores not pointed
Asci 2–4–6-spored
Spores 60–90–100 μ long.....*D. vismiae* Stevens and Manter
Asci 2–4–6–8-spored
Spores 30–38 μ long.....*D. mucosa* Syd.

4. **Dictyothyriella guianensis** Stevens and Manter, n. sp. (figs. 10–13).—Thyriothecia epiphyllous, either gregarious or somewhat scattered, 590–850 μ in diameter, margin blue-green, netted; ostiole round, 25–45 μ in diameter; asci cylindrical, short stipitate, 4–6–8-spored, rarely 2-spored, usually 4–6-spored, 100–155×15–25 μ; paraphyses copious, filamentous, crooked; spores typically 2-septate, constricted, cells easily separating, tip cell always larger and pointed, 30–60×5–8 μ.

On *Costus* sp., British Guiana: Rockstone, July 16, *1005;* on *Posequeria latifolia*, British Guiana: Kartabo, July 22, *534;* on *Maurita* sp., Trinidad: Cumuto, August 16, *1007;* on *Philodendron* sp., British Guiana: Kartabo, July 23, *1006;* on *Licenia* sp., *Tabernaemontana* sp., and *Bauhinia* sp., British Guiana: Rockstone, July 17, *479*, *473*, *469;* on unknown member of the Marantaceae, British Guiana: Kartabo, July 21, *505;* on unknown member of the Apocynaceae, British Guiana: Tumatumari, July 11, *163;* on unknown host, British Guiana: Kartabo, July 17–23, *530*, *606*, *608;* Tumatumari, July 8–11, *993*, *155;* Wismar, July 14, *275*.

This fungus showed considerable variation, and often tended to approach *D. heterosperma*, which it closely resembles, epecially in spore shape. *D. guianensis*, however, is always epiphyllous (although this cannot be considered a very significant character), usually has less than eight spores in the ascus, and all measurements are usually less than those of *D. heterosperma*.

5. **Dictyothyriella philodendri** Stevens and Manter, n. sp. (figs. 24–26).—Thyriothecia epiphyllous, 960 μ in diameter, ostiole round, 25 μ in diameter; asci clavate to elongate, often slightly curved, stipi-

tate, 150–155×17–18 μ, 2–4-spored; paraphyses filamentous, crooked, not longer than asci; spores 2–4-septate, deeply constricted, cells easily separating, sometimes separate in the ascus, terminal cell elongated-pyriform with narrow distal region, longer than other cells, spores 50–60 μ×7–9 μ.

On *Philodendron* sp., British Guiana: Kartabo, July 23, *1006*, *479*.

This fungus is close to *D. guianensis*. It differs in possessing usually 2-spored asci, asci and spores more elongated, and spores frequently 3 or 4-septate.

6. DICTYOTHYRIELLA HETEROSPERMA Syd., Ann. Myc. **15**:231. 1917 (figs. 14–23)

On *Coccoloba* sp., British Guiana: Kartabo, July 23, *597;* on unknown member of the Myrtaceae, British Guiana: Rockstone, July 17, *486;* on unknown member of the Anonaceae, with *Micropeltella minima*, British Guiana: July 24, *1011;* on unknown host, British Guiana: Kartabo, July 22–24, *571*, *600*, *1003*, *666*.

In his original description, SYDOW pointed out the high degree of variability of this fungus. Some of these specimens showed an even greater degree of variability. Thyriothecia were occasionally amphigenous, but commonly hypophyllous. The asci contained almost any number of spores up to eight. It can be seen that numerous characters must be considered to separate this species from *D. guianensis*.

An unusual condition was observed in one of the specimens, where the ascus frequently had four or six spores. One ascus was found with three large spores and one spore near the tip considerably dwarfed (fig. 16). The very marked difference between the size of this single spore and the others occupying the ascus seems to give a clue to the variability of the number of spores in the asci of this group, since it appears that some spores fail to develop, and finally degenerate, owing perhaps to competition among the spores in a single ascus.

Specimen no. 600 (figs. 18–22) revealed a remarkable variation, not only in spore septation, but also in the number of spores in the ascus. Thus in a single thyriothecium, one ascus contained four spores all many-septate (4–6-celled), another ascus had only three spores one of which was 4-celled, and another ascus had eight spores of normal septation. One ascus was found with only one spore, a number of asci with two spores, while a 4 or 6-spored condition was most common. The measurements of all parts coincided perfectly with those of *D. heterosperma*. Fortunately, specimens of this species identified by SYDOW were available for comparison. The principal difference noted was in the number of spores in the asci. In the authentic *D. heterosperma*, either six or eight spores were almost invariably present. This difference, however, does not seem to be sufficient to exclude the present specimens, and they are accordingly identified as *D. heterosperma*. Associated with this fungus (no. 600) was *Micropeltella minima*.

7. **Dictyothyriella vismiae** Stevens and Manter, n. sp. (figs. 27–29).—Thyriothecia epiphyllous, 600–700 μ in diameter, margin blue-green; ostiole round, 40 μ in diameter; asci obclavate to cylindrical, sessile or very short stipitate, 4–6-spored, paraphyses copious, filamentous, crooked; asci 140–160×20–35 μ; spores 2-septate, deeply constricted, cells nearly equal and easily separating, tip cell not pointed, cells nearly oval in shape, spores 60–90×12–16 μ.

On *Vismia* sp., British Guiana: Rockstone R. Ry., July 15, *1014;* on *Coccoloba* sp., British Guiana: Rockstone, July 17, *476;* on unknown member of the Loranthaceae, British Guiana: Kartabo, July 21, *540;* on unknown host, British Guiana: Kartabo, July 23, *591*.

This fungus differs from *D. heterosperma* and *D. guianensis* in having all the cells of the spore nearly equal, and with the tip cell bluntly rounded instead of pointed. Material from nos. *540*, *476*, and *591* sometimes showed spores so large that these numbers were at first allotted to a new species. As in all other respects they were similar to *D. vismiae*, and as even spore measurements frequently agreed, they are included in that species even though some of the spores were 50–150 μ in length and asci sometimes 250 μ long.

MICROPELTIS Mont., Pl. Cell. de L'ile de Cuba, p. 325. 1842

The following species of *Micropeltis* are described having thyriothecia with radial coverings, and are therefore considered as excluded from the Hemisphaeriaceae: *M. sirie* Rac., *M. bambusae* Pat., *M. heteropteridis* Theiss. The two following species are inadequately described: *M. stigma* Cooke, *M. asterophora* B. and Br. Species described as without paraphyses are considered as belonging to *Micropeltella*.

Thyriothecia blue-green
- Spores with constant number of septa
  - Spores with 3 septa
    - Asci 4-spored ..... *M. tetraspora* Stevens and Manter
    - Asci usually 8-spored
      - No true ostiole ..... *M. pitya* Sacc.
      - Ostiole present
        - Asci 6–8-spored ..... *M. marginata* Mont.
        - Asci 8-spored
          - Hypophyllous ..... *M. albo-ostiolata* P. Henn.
          - Epiphyllous
            - Asci clavate ..... *M. depressa* Cke. / *M. oleandri* Br. and Har.
            - Asci oblong ..... *M. pometiae* Rehm
          - Amphigenous ..... *M. vagabunda* Speg.

Spores with 4 septa.....*M. clavigera* Sacc.
Spores with 5 septa
Spores constricted.....*M. applanata* Mont.
Spores not or little constricted
Asci 8-spored.....*M. similis* Syd.
Asci 4–6–8-spored.....*M. acalyphae* Syd.
Spores with 8 septa.....*M. viridiatia* Wint.
Spores with variable number of septa
Spores with 3–4 septa
Asci always 2-spored.....*M. dispora* Stevens and Manter
Asci 8-spored.....*M. javanica* (Rac.) Sacc. and Trott.
Spores with 3–5 septa
Amphigenous, asci at least 80 μ long
Asci 6–8-spored, spores constricted.....*M. dissociabilis* Stevens and Manter
Asci 8–spored, spores little constricted.....*M. evonymi* Syd.
Epiphyllous, 8-spored
Asci 40–60 μ.....*M. orchidearum* P. Henn.
Asci 150–180 μ.....*M. zingiberaceicola* P. Henn.
Spores 4–5, 4–5–6, or 4–6-septate
Asci 2–4-spored, usually 2, spores usually 5-septate..*M. aroidicola* Stevens and Manter
Asci 3–4-spored, usually 4, spores usually 4-septate..*M. guianensis* Stevens and Manter
Asci 4–8-spored, spores clavate.....*M. rhopaloides* Syd.
Asci 8-spored.....*M. aeruginascens* Rehm; *M. borneensis* Syd.
Spores 5–7, 5–8, or 6–7-septate
Central cell longitudinally divided.....*M. balansae* Speg.
Spores all cross-walled only
2–8-spored, 5–8-septate, spores 50 μ.....*M. alsodeiae* (P. Henn.) Th.
4–8-spored.....*M. samarensis* Syd.
8-spored.....*M. corynespora* Sacc.
Spores 8–16-celled, clavate.....*M. congoensis* Beeli
Thyriothecia brown or brown-black[2]
Spores 5–7-septate.....*M. leoniae* P. Henn.
Spores 3-septate
Hypophyllous, asci fusoid.....*M. aureo-brunnea* P. Henn.
Epiphyllous, asci clavate.....*M. rechingeri* v. Höhn.

[2] These last three species probably do not belong in *Micropeltis* because of the nature of the thyriothecia. *M. sprucei* (Cke.) Sacc. belongs in that group possessing spores with 3–5 septa, but it is insufficiently described to be given an exact position in the key.

8. **Micropeltis tetraspora** Stevens and Manter, n. sp. (fig. 30).—Thyriothecia sparse, hypophyllous, 585 μ in diameter, margin blue-green, surrounded by transparent halo; ostiole unevenly round, 40 μ in diameter; asci cylindrical to subclavate; paraphyses copious, filamentous; asci always 4-spored, 146–187×37 μ; spores 3-septate, deeply constricted, cells loosely connected, basal cell elongated; spores 93–133×13–16 μ.

On unknown host, British Guiana: Kartabo, July 24, *653*.

This fungus differs from *M. albo-ostiolata* in having 4 instead of 8-spored asci, and in greatly different spore measurements.

In general appearance and measurements it resembles *M. dissociabilis*, but this latter fungus has 6–8-spored asci and 3–4–5-septate spores.

9. **Micropeltis dispora** Stevens and Manter, n. sp. (figs. 31–33).—Thyriothecia amphigenous, 817 μ in diameter, border blue-green; ostiole round, 40–48 μ in diameter; asci cylindrical, short stipitate, 160×26 μ, always 2-spored, paraphyses copious, short, crooked, filamentous; spores 3–4–septate, very rarely 5-septate, constricted, 90–103×8–13 μ.

On unknown host, British Guiana: Kartabo, July 23, *593*.

This fungus is interesting in the constant 2-spored condition of the mature ascus, and in the variation in spore septation. Thus three asci were found in which one of the two spores was 3-septate and the other 4-septate; one ascus in which both spores were 4-septate; one ascus in which both spores were 3-septate; and one ascus was found with one spore 5-septate. The fungus differs from neighboring species (*M. evonymi*, *M. rhopaloides*, and *M. dissociabilis*) in the 2-spored condition of the ascus, none of the other species ever possessing less then six spores in the ascus. It is perhaps closer to *M. guianensis*, but this latter species is distinct from it in having 3–4-spored asci, and also in quite different spore measurements.

10. **Micropeltis dissociabilis** Stevens and Manter, n. sp. (fig. 38).—Thyriothecia scattered, amphigenous, 535–700 μ in diameter, margin blue-green, open netted; ostiole round in mature thyriothecia; opening covered with thin membrane in young thyriothecia; asci cylindrical to clavate, sessile, 6–8-spored, 160–175×38 μ; paraphyses short, crooked, filamentous; spores 3–4–5-septate, usually 4-septate, deeply constricted, cells egg-shaped when nearly mature, ellipsoidal when mature, easily separating, end cells rounded, basal cell sometimes attenuated, 87–125×12–15 μ.

On unknown host, British Guiana: Coverden, August 8, *785*.

This fungus differs from *M. rhopaloides* in shape of spores. It differs from *M. evonymi* in not having typically 3-septate spores, in number of spores in the ascus, and in having larger spores and asci; from *M. aroidicola* in size of parts and in number of spores in the ascus. The fungus is of interest in showing a striking resemblance to the common species of *Dictyothyriella*, but differing from them in having 4-septate instead of 2-septate spores. It illustrates a possible close relationship between *Micropeltis* and *Dictyothyriella*.

11. **Micropeltis aroidicola** Stevens and Manter, n. sp. (figs. 34, 35).—Thyriothecia epiphyllous, 1070 μ in diameter, margin netted, blue-green; ostiole round, 15 μ in diameter; asci clavate to cylindrical, sessile, 2–4-spored, usually 2-spored, 80–95×15–17 μ; paraphyses copious, filamentous, crooked, 1.5 times length of ascus; spores 4–6-septate, usually 5-septate, constricted, cells loosely joined, tip cell spherical, basal cell often slightly elongated; spores 30–32×10 μ.

On *Philodendron* sp., British Guiana: Kartabo, July *23*, *544*.

This fungus differs from *M. rhopaloides* and *M. borneensis* in shape of the spore and in the number of spores in the ascus. *M. aeruginascens* also has a different spore shape and more spores in the ascus. *M. dispora* has a much larger spore measurement.

12. **Micropeltis guianensis** Stevens and Manter, n. sp. (fig. 36).—Thyriothecia epiphyllous, scattered, 750 μ in diameter, ostiole round, 45–50 μ in diameter; asci clavate to cylindrical, shortly stipitate, 125–140×15–25 μ, apex blunt, stipe 3–8 μ, 3–4-spored; paraphyses copious, filamentous, crooked; spores 4–5-septate, constricted, hyaline, inordinate, 50–65×10 μ.

On unknown host, British Guiana: Tumatumari, July 12, *241*.

It differs from *M. samarensis* Syd. in having 4–5-septate instead of 6–7-septate spores, also in spore shape; from *M. rhopaloides* Syd. in spore shape and size.

13. MICROPELTIS RHOPALOIDES Syd., Ann. Myc. **15**:230, 1917 (fig. 37)

On unknown member of the Bignoniaceae, British Guiana: Penal Settlement, July 25, *683*.

This fungus differs from the original description only in being epiphyllous instead of amphigenous, and in having slightly larger thyriothecia.

MICROPELTELLA Syd., Ann. Myc. 11:404, 1913

All *Micropeltis* species described as aparaphysate are included in the following key. EARLE described *M. longispora* as without paraphyses, but as the thyriothecial membrane is dark brown, it cannot belong to either *Micropeltis* or *Micropeltella* and is omitted from the key.

Spores with not more than 3 septa
- Ascus 5–6-spored ..... *M. exilis* (Schulz.), n. comb.
- Ascus 8-spored
  - Spores with 2–3 septa ..... *M. bogoriensis* (v. Höhn.) Syd.
  - Spores with 3 septa
    - Ascus obclavate ..... *M. minima* Stevens and Manter
    - Ascus fusoid
      - Ascus 36–40 μ ..... *M. leucoptera* (P. and S.) Syd.
      - Ascus 45–55 μ ..... *M. aequalis* (Sacc.), n. comb.
      - Ascus 85 μ ..... *M. immarginata* (Rehm), n. comb.

Spores 3–4-septate
- Ascus usually 8-spored ..... *M. consimilis* Rehm. / *M. merillii* Syd.

Spores 4-septate
- Ascus 180–200 μ ..... *M. maxima* Speg.
- Ascus 70 μ ..... *M. caunae* (Speg.), n. comb.

Spores 4–5-septate
- Spores not constricted ..... *M. acrensis* Syd.
- Spores constricted
  - Hypophyllous ..... *M. clavispora* Syd.
  - Epiphyllous ..... *M. constricta* Stevens and Manter

Spores 5–6–7-septate
- Ascus 8-spored ..... *M. agusanensis* Syd.
- Ascus 4–6–8-spored
  - Epiphyllous, spores 5–7-septate ..... *M. makilingiana* Syd.
  - Hypophyllous, spores 5–6-septate ..... *M. ramosii* Syd.

Spores 6-many septate, asci 4–8-spored ..... *M. paetensis* Syd.
Spores 7-septate, asci 8-spored ..... *M. macropelta* (P. and S.) Syd.
Spores 7-septate, asci 2–8-spored ..... *M. sparsa* Stevens and Manter
Spores 7–9-septate, asci 8-spored ..... *M. leptosphaeriodes* Speg.

M. uleana (Syd.) and *M. albo-marginata* (Speg.) Syd. are too insufficiently described to be definitely placed in the key. *M. uleana* appears to be very near *M. immarginata*, and *M. albo-marginata* seems close to *M. consimilis*.

14. **Micropeltella minima** Stevens and Manter, n. sp. (fig. 39).—Thyriothecia epiphyllous, 259–320 μ in diameter, margin

blue-green, netted, ostiole round, 20 μ in diameter; asci obclavate, flask-shaped, 8-spored, aparaphysate, 40–55×20 μ; spores 3-septate, 15–17×3–5 μ, both ends rounded, cells nearly spherical.

On unknown member of the Anonaceae, British Guiana: Tumatumari, July 9, *1002;* Kartabo, July 24, *1012;* on unknown host, British Guiana: Kartabo, July 23, *1010*.

This fungus is near *M. albo-marginata* and *M. leucoptera*. It differs in shape and size of asci, and in being constantly 3-septate. Specimen no. *1010* differed from the type species only in having larger thyriothecia (up to 468 μ). With it was associated *Dictyothyriella heterosperma*.

15. MICROPELTELLA ACRENSIS Syd., Ann. Myc. **14**:89. 1916

On unknown member of the Celastraceae, British Guiana: Rockstone, July 15, *359*.

16. **Micropeltella constricta** Stevens and Manter, n. sp. (figs. 40–42).—Thyriothecia epiphyllous, scattered, 320–450 μ in diameter, margin blue-green, only slightly carbonaceous, ostiole round, 25–35 μ in diameter; asci cylindrical to obclavate, sessile, aparaphysate, 75–88×17–25 μ, 6–8-spored; spores 3–6-septate, usually 4–5-septate, tip cell bluntly rounded, 25–45×5–10 μ, constricted.

On *Coccoloba* sp., Trinidad: Cumuto, July 16, *914;* on unknown member of the Anonaceae, British Guiana: Kartabo, July 22, *568*.

This fungus agrees with *M. acrensis* Syd. except in having plainly constricted spores. The latter specimen (no. *568*) differed from the type species in the size of the thyriothecia. Here they almost always measured about 935 μ in diameter and were mostly carbonaceous. Note should also be made of the deceptive appearance of empty asci which resemble paraphyses. Only careful examination shows that what appear to be straight paraphyses are in reality the edges of husklike, emptied, or degenerate asci. This is common in *Micropeltella*, and, in the examination of any material, structures which resemble any form of paraphyses other than the usual crooked, filamentous type, should be carefully studied.

17. **Micropeltella sparsa** Stevens and Manter, n. sp. (figs. 43, 44).—Thyriothecia epiphyllous, sparse, blue-green, only slightly carbonaceous, border membranous, transparent, thyriothecia 360–400 μ in diameter; ostiole irregularly round, 25 μ in diameter; asci sometimes visible through the thyriothecial covering, radially arranged about a non-ascigerous central region, cylindrical to fusoid, sessile, aparaphysate, thick walled, bluntly rounded at each end,

80–100×24–28 μ, 2–3–4–5–6–7–8-spored; spores fusoid-cylindrical, 6–7–8-septate, usually 7–8-septate, middle cells larger, tip cells bluntly rounded, slightly constricted, 36–48×8–10 μ.

On *Anacardium occidentale*, British Guiana: Rockstone, July 13, *1013*.

This fungus showed some points of resemblance to *M. paetensis* Syd., but differs in having much smaller thyriothecia with hyaline borders, and in number of spores in the ascus, as well as being on a widely different host.

Scolecopeltidium Stevens and Manter, n. gen.

Thyriothecia superficial, disc-shaped, true mycelium lacking, margin open netted, blue-green, ostiole round, spores filiform, many-septate, paraphyses present. Like *Scolecopeltis* except that paraphyses are present; like *Micropeltis* except that spores are filiform.

The type species of *Scolecopeltis* is aparaphysate, while about one-half of the described species possess paraphyses. In view of the fact that most of the new material encountered in the present study appeared to possess paraphyses, it has seemed convenient to separate such species by the erection of a new genus. The following former *Scolecopeltis* species fall into the new genus *Scolecopeltidium: S. salacensis* Rac., *S. gaduae* P. Henn., *S. guettardae* P. Henn., *S. trivialis* Rac., *S. bakeri* Syd., *S. connari* Syd., and *S. garciniae* Rehm.

Asci not more than 4-spored
- Asci obclavate, spores up to 48-septate...*S. mirabile* Stevens and Manter
- Asci cylindrical, spores 11–14-septate. *S. multiseptatum* Stevens and Manter

Asci 3–6-spored.....*S. hormosporum* Stevens and Manter

Asci 8-spored
- Spores 6–7-septate.....*S. connari* (Syd.), n. comb.
- Spores 6–12-septate.....*S. salacensis* (Rac.), n. comb.
- Spores 10–12-septate
  - Hypophyllous, 4–8-spored.....*S. bakeri* (Syd.), n. comb.
- Spores 13–16-septate
  - Epiphyllous, asci 160–175 μ.....*S. liciniae* Stevens and Manter
- Spores 17-septate
  - Asci 120–130 μ.....*S. garciniae* (Rehm), n. comb.
- Spores 14–20-septate.....*S. gaduae* (P. Henn.), n. comb.
- Spores 15–23-septate
  - Epiphyllous.....*S. costi* Stevens and Manter
- Spores 20–26-septate
  - Hypophyllous.....*S. guettardae* (P. Henn.), n. comb.

This key does not include *S. trivialis*, the spore septation of which could not be found in the description. It apparently resembles *S. salacensis*, differing in an ascus measurement of 149–165×12 μ.

18. **Scolecopeltidium mirabile** Stevens and Manter, n. sp. (figs. 47–50).—Thyriothecia hypophyllous, 750–965 μ in diameter, margin wide, open netted, blue-green; ostiole round, minute, 15–20 μ in diameter; asci obclavate, sessile, 150×40 μ, 2–4-spored; paraphyses short, filamentous, not crooked; spores filiform, many-septate (up to 48), constricted, variable, sometimes curled in ascus and twice as long as ascus; 115–125×8–10 μ up to 275×8–10 μ.

On unknown member of the Simarubaceae, British Guiana: Kartabo, July 23, *678*.

19. **Scolecopeltidium multiseptatum** Stevens and Manter, n. sp. (figs. 51–53).—Thyriothecia epiphyllous, scattered, large, up to 1125 μ in diameter, ostiole round, 15 μ in diameter; asci cylindrical, sessile, broadly rounded at both ends, 125–138×27–37 μ, 2–4-spored; paraphyses filamentous, crooked; spores filiform, 12–15-septate, constricted, each cell except the two end cells slightly constricted in the middle, straight or slightly curved, 100–120×10 μ.

On Philodendron sp., British Guiana: Wismar, July 24, *1004;* July 14, *264;* Kartabo, July 22, *544*.

20. **Scolecopeltidium hormosporum** Stevens and Manter, n. sp. (figs. 45, 46).—Thyriothecia epiphyllous, 1016–1070 μ in diameter, scattered, carbonaceous, very narrow blue-green margin; ostiole irregularly round, about 25 μ in diameter, not over 35 μ in diameter; asci clavate, sessile; paraphyses filamentous, slightly crooked, branched; asci either 3 or 6-spored, 175–195×32–45 μ; spores filiform, curved, many-celled, usually 25 or 26, immature spores of 6-spored ascus in 3 rows, mature spores often curved about one another, nearly as long as ascus, 165×7–8 μ, tip cell slightly elongate, basal cell spherical and larger, other cells spherical, deeply constricted.

On unknown host, British Guiana: Kartabo, July 23, *581*.

21. **Scolecopeltidium Liciniae** Stevens and Manter, n. sp. (fig. 54).—Thyriothecia epiphyllous, 500–600 μ in diameter, ostiole round, 25–35 μ in diameter; margin of thyriothecia open netted, blue-green; asci cylindrical, sessile or very short stipitate, 160–175×45–48 μ, 8-spored; paraphyses filamentous, short, crooked, not copious;

spores filiform, 13–16-septate, not constricted, straight or slightly curved, 100×10 μ.

On *Licenia* sp., British Guiana: Rockstone, July 17, *479;* on unknown member of the Marantaceae, British Guiana: Rockstone, July 16, *423*.

22. **Scolecopeltidium costi** Stevens and Manter, n. sp. (figs. 58–60).—Thyriothecia large, epiphyllous, blue-green, netted margin, 800–900 μ in diameter; ostiole round, up to 55 μ in diameter; asci cylindrical, little or no stipe, 8-spored, 175–200 μ long when mature and 37–45 μ wide; paraphyses copious, filiform, crooked; spores filiform, many-septate, 15 up to 23, constricted, straight or curved; young spores with fewer septa, young spores spindle-shaped at stage of 4–5-septa; mature spores with middle cells larger and rounded, longest spore 137×12.5 μ.

On *Costus* sp., British Guiana: Rockstone, July 16, *425;* on *Serjania paucidentata*, British Guiana: Kartabo, July 23, *585;* on unknown host, British Guiana: Tumatumari, July 12, *234*.

Specimen no. *585* differed from the type species in being hypophyllous. While the largest spore in the type species measured 137 μ, many spores apparently mature measured about 100 μ.

SCOLECOPELTIS SPEG., Bol. Acad. Cien. Cord. **11**:196. 1889

No true specimens of this genus were found in the present studies, although forms with filiform spores and with paraphyses were quite numerous. As has been noted, these have been separated from *Scolecopeltis*, which is without paraphyses, and considered in the new genus *Scolecopeltidium*. Because the two genera are so closely related, a key of the described *Scolecopeltis* species is here included. It should also be recalled that a few very similar species, differing only in possessing "stellate" ostiole, have been described by SPEGAZZINI under *Scolecopeltella*. These species are not included in the key. Following THEISSEN and SYDOW, *Scolecopeltopsis* v. Höhn. is considered as synonymous with *Scolecopeltis*.

Asci 2–3–4-spored ..... *S. aeruginea* Zimm.
Asci 8-spored
  Spores 5–7–9-septate ..... *S. transiens* (v. Höhn.) Sacc. and Trot.
  Spores many-septate
    Asci 75–100 μ (not over 100 μ)
      Hypophyllous, spores 10–15-septate
        Asci 20–25 μ wide ..... *S. pachyasca* Speg.
        Asci 42–45 μ wide ..... *S. dissimilis* Rehm

Epiphyllous
Asci clavate.....*S. bauhiniae* P. Henn.
Asci at least 110 μ long
Asci 110×40 μ, spores 40-septate.....*S. ophiospora* (Pat.) Sacc.
Asci 130–180 μ
Spores blunt, 15-septate.....*S. quindecieseptata* P. Henn.
Spores pointed.....*S. tropicalis* Speg.
Asci 180–200 μ
Spores 15–20-septate.....*S. portoricensis* Speg.

RICK has listed a species, *Scolecopeltis theissenii* Rick, under the herbarium reference "exsicc. Rick, F. a. am. 250," but no printed description of the species or reference to publication could be found.

Theciopeltis Stevens and Manter, n. gen.

Thyriothecia superficial, circular, disc-shaped, covering open netted, not radial, rich brown becoming opaque toward the center, border hyaline, no true ostiole, irregular stellate opening in ripe thyriothecia, little or no mycelium.

This genus is most like *Phragmothyriella* or *Microthyriella*, but differs quite markedly in the appearance of the covering of the thyriothecia, which is formed by a network of hyphae anastomosing or interweaving instead of the apparently cellular and easily disintegrating covering found in *Phragmothyriella* and *Microthyriella*. The breaking of the thyriothecia is at a definitely central point, while in *Phragmothyriella* and *Microthyriella* it occurs by a kind of fragmentation of the thin and quite transparent covering. On account of the netlike structure of *Theciopeltis* it is placed in the subfamily Dictyopeltineae, where it appears to be the first representative which is brown in color.

23. **Theciopeltis guianensis** Stevens and Manter, n. sp. (figs. 6, 7, 61).—Thyriothecia epiphyllous, 160–200 μ in diameter, circular, rich brown, widely open netted, border hyaline, no true ostiole, sometimes an irregular stellate opening; asci spherical (obclavate when mature), sessile, 20–30 μ, paraphyses few, slightly crooked, not branched; asci 6 or 8-spored; spores cylindrical, 1–2–3-septate, hyaline, 12–20×4–5 μ.

On unknown host, British Guiana: Rockstone, July 17, 470.

THRAUSMATOPELTINEAE

The subfamily Thrausmatopeltineae proves somewhat more difficult, although the difficulties are chiefly connected with the species and genera. The subfamily itself is quite distinct in possessing thy-

riothecial coverings of pseudo-parenchymatic tissue brown or yellow-brown in color. The individual cells in this covering are small and tend to be angular. Often, especially when an ostiole is absent, the covering breaks down into irregular pieces (as in *Microthyriella*). Hymenia (or ascigerous tissue), according to THEISSEN and SYDOW, may be one or many in the thyriothecia, and each of these hymenia may bear one or many asci. These conditions of the hymenia are used by THEISSEN and SYDOW to separate wide groups of genera. Most forms occur in the group described as "only one hymenium present." These authors place here *Microthyriella*, although, as pictured by VON HÖHNEL (**21**), the asci in this genus are somewhat separated by hyphal growth ("pseudo-paraphyses"). Fortunately, separation of genera on the basis of the presence of "many hymenia" is rendered much less significant due to recent research. In this group, THEISSEN and SYDOW list three genera, each of but few species; *Polyclypeolum*, *Eremotheca*, and *Eremothecella*.

Eremotheca was described by THEISSEN and SYDOW in 1917 (**19**), who used *Rhytisma rufulum* B. and C. as the type, and named one new species, *E. philippinensis* Syd. In 1918, VON HÖHNEL (**26**) declared that the type species of *Eremotheca* is identical with *Microthyriella rickii* v. Höhn., and that *E. philippinensis* belongs in the same genus, differing from *M. rickii* only slightly in spore measurement. As a *Microthyriella philippinensis* had already been described, VON HÖHNEL called *E. philippinensis*, *M. macrospora*. Specimens of this fungus identified by SYDOW were available for study, and in every character seemed to agree with those of *Microthyriella*, so that we follow VON HÖHNEL in accepting *Microthyriella* as a synonym for *Eremotheca*.

Eremothecella Syd. (**19**) has but one species, *E. clamicola*. VON HÖHNEL (**27**) studied this and found it to be a lichen. It was identified by ZAHLBRUCKNER as belonging to *Arthoniopsis*. A cotype of this species was available for our study. It is evident that some lichens may be very closely similar in appearance to members of this group of the Hemisphaeriaceae. This particular specimen could very easily be mistaken as a member of the subfamily Gymnopeltineae Stevens and Guba (**11**), as there appears to be no covering over the asci.

Polyclypeolum has but a single species, *P. abietes* (v. Höhn.)

Theiss. VON HÖHNEL (25) expresses doubt that this genus can be separated from *Schizothyrium*.

All of the remaining genera of the Thrausmatopeltineae are more or less similar to *Microthyriella*, the most common genus. This genus was established in 1909 by VON HÖHNEL (21), with *M. rickii* Rehm as the type species. The covering of the thyriothecia is composed of small cells (4- or 5-sided), is brown, and lacks an ostiole. When mature the whole covering fragments, falling apart into irregular pieces. The spores are 2-celled.

Several other genera are so similar to *Microthyriella* that attention should be called to their exact position. At the time *Microthyriella* was described, VON HÖHNEL observed that it was like *Microthyrium* except that an ostiole was lacking. *Microthyrium*, however, is now considered by THEISSEN and SYDOW to belong in the Microthyriaceae, so that true *Microthyrium* species have a radial covering.

The spore septation, which is very constant here, easily separates *Haplopeltis* Theiss. (18) with 1-celled spores, and *Phragmothyriella* v. Höhn. (24) which has many celled spores. *Haplopeltis* has an ostiole, but *Phragmothyriella* is exactly similar to *Microthyriella* except for spore septation.

Clypeolum Speg. (4) is very similar to *Microthyriella*, as pointed out by VON HÖHNEL (22). The original description of *Clypeolum* gives it a carbonaceous thyriothecium and cylindrical asci, but VON HÖHNEL, in studying the type species, found the structure of the thyriothecium to agree with that of *Microthyriella*. He separated the two because of different shape of asci, and because *Clypeolum* possesses typical thready paraphyses, while the paraphyses of *Microthyriella* are branched and united into a tissue-like mass. On this basis, he allotted a number of former *Clypeolum* species to *Microthyriella*.

SPEGAZZINI, in 1923 (8), named a new genus, *Clypeolina*. This genus is like *Clypeolum* except that it has an ostiole. The name *Clypeolina* is preoccupied, however, as THEISSEN gave it to a genus of Microthyriaceae (14). We therefore propose the name *Clypeolopsis* Stevens and Manter for the genus *Clypeolina* named by SPEGAZZINI in 1923.

Schizothyrium Desm. (2) is also very similar to *Microthyriella*, as

shown by VON HÖHNEL (25). *Schizothyrium*, however, is not usually circular in form, but tends to be elongate (the type species measured 250–300 μ long by 180–200 μ wide). It has a thick, often carbonaceous membrane, instead of the thin one found in *Microthyriella*. It lacks an ostiole, but when ripe the thyriothecia open by means of a longitudinal split. The surface of the thyriothecia is sparsely covered with mycelial strands, which stream out over the angular cells of the membrane proper, and may extend slightly beyond the border.

A key to the genera of the Thrausmatopeltineae following the conclusions of this discussion follows.

One hymenium present
- Spores 1-celled, colorless ..... *Haplopeltis* Theiss.
- Spores 2-celled, colorless
  - Thyriothecia round
    - Ostiole present ..... *Clypeolopsis* Stevens and Manter
    - Ostiole lacking
      - Paraphyses present ..... *Clypeolum* Speg.
      - Paraphyses lacking ..... *Microthyriella* v. Höhn.
  - Thyriothecia elongated ..... *Schizothyrium* Desm.
- Spores many celled, colorless ..... *Phragmothyriella* v. Höhn.

More than one hymenium present ..... *Polyclypeolum* Theiss.

MICROTHYRIELLA V. HÖHN., SITZ. KAIS. ACAD. WISS. WIEN 118:371. 1909

REHM'S former *Microphyma rickii* was taken by VON HÖHNEL as the type species for *Microthyriella*. The characters of the genus are well defined and have already been outlined. The relationships of the genus to *Clypeolum* and *Schizothyrium* have also been discussed.

Microthyriella is remarkable for the constancy of some characters which are notably variable among the Dictyopeltineae. For example, the asci are almost always ovoid-globose and sessile, always 8-spored; while the spores are constantly 1-septate. The large number of species are hence very largely separated on the size of parts. THEISSEN in 1914 (17) reviewed the genus up to that date, and lists fourteen species. Since then the number of species has considerably increased, and the genus is rather difficult to analyze.

Of the twenty-four species of *Microthyriella* now described, two possessed only immature spores, so their exact position cannot at

present be determined. These species are *M. celastri* (E. and K.) Th. and *M. perexigua* (Rob.) v. Höhn. To be listed as possible *Microthyriella* species are *Clypeolum sulcatum* Starb. and C. *megalosporum* Speg., both of which VON HÖHNEL (22) suggested as being probable *Microthyriella* species, although he did not rename them. Most of the other species which VON HÖHNEL suggested at the same time in a similar manner have since been definitely placed in the genus *Microthyriella*. In the absence of material for study, it has seemed best simply to point out that *C. sulcatum* might be near *M. uvariae* and *M. philippinensis*, although clearly distinct from them; and *C. megalosporum* might be near *M. rickii*. To these species are added two new species from British Guiana. THEISSEN (18) gives *M. olivacea* (v. Höhn.) Th. as a new combination for *Asterella olivacea* v. Höhn. VON HÖHNEL (27) later made the same change, apparently unaware that THEISSEN had already done so. The correct name therefore should read *Microthyriella olivacea* (v. Höhn.) Theiss.

As already noted, *Eremotheca philippenensis* Syd. becomes *Microthyriella macrospora* v. Höhn. *Microthyriella hibisci* Stevens and Guba (11) should perhaps be accorded a new genus, as the possession of an ostiole is not in agreement with the character of the genus.

Ostiole present ..... *M. hibisci* Stevens and Guba
Ostiole absent
  Spores constricted
    Asci round
      Spores 8 μ long ..... *M. intricata* (E. and M.) Th.
      Spores 37–47 μ long ..... *M. guianensis* Stevens and Manter
    Asci ovate
      Spores 10 μ long ..... *M. rimulosa* (Speg.) Th.
      Spores 28–30 μ long ..... *M. pseudocuticulosa* (Winter) v. Höhn.
  Spores not or little constricted
    Asci pyriform
      Spores 9 μ ..... *M. minutissima* (Speg.) Th.
    Asci spherical
      Asci 25 μ in diameter ..... *M. cuticulosa* (Cke.) v. Höhn.
      Asci 27–35 μ in diameter ..... *M. discoidea* (Cke.) Th.
    Asci ovoid or ellipsoid
      Spores not over 13 μ
        Asci with short stipe ..... *M. astoma* (Speg.) The

Asci sessile
Asci 16–20 μ long ..... *M. rubi* Petrak.
Asci 25 μ long ..... *M. olivacea* (v. Höhn.) Th.
Asci 50–75 μ long ..... *M. distincta* Stevens and Manter
Spores 15 μ long
Hypophyllous, spores clavate ..... *M. applanata* (Rehm) v. Höhn.
Epiphyllous, spores obclavate ..... *M. patelloides* (E. and M.) Th.
Spores 18–26 μ long ..... *M. uvariae* (P. Henn.) Th.; *M. philippinensis* Syd.
Spores at least 32 μ long
Thyriothecia 150–250 μ, epiphyllous ..... *M. uleana* Syd.
Thyriothecia at least 500 μ
Asci 120–140 μ ..... *M. malacoderma* v. Höhn.
Asci 90 μ ..... *M. longispora* (Pat.) Th.
Asci not over 85 μ
Spores elongate, 60–70 μ ..... *M. coffeae* (P. Henn.) Th.
Spores oblong, not over 55 μ
Asci elliptical ..... *M. rufula* (B. and C.) Th. and Syd.
Asci ovate
Spores 32–36 μ ..... *M. rickii* (Rehm) v. Höhn.
Spores 36–44 μ ..... *M. modensis* (P. Henn.) Th.; *M. scutelliforme* (Rehm) Th.
Spores 42–55 μ ..... *M. macrospora* v. Höhn.

24. MICROTHYRIELLA INTRICATA (E. and M.) Theiss., Ann. Myc. 10: 190. 1912

On *Tapira* sp., British Guiana: Kartabo, July 22, *980*.

25. **Microthyriella guianensis** Stevens and Manter, n. sp. (fig. 62).—Thyriothecia hypophyllous, brown, tissue psuedo-parenchymatous, very delicate and easily breaking into parts, flat, non-carbonaceous, no ostioles, 375–535 μ in diameter; each ascus in separate locule, the locules separated by a thready tissue, asci spherical, 50–65 μ in diameter, aparaphysate, 8-spored; spores 2-celled, hyaline, constricted, cells equal, spores 37–47 × 10–12 μ.

On unknown member of the Ochnaceae, British Guiana: Tumatumari, July 10, *130*.

This fungus differs from *M. macrospora* in having spherical asci and in the constricted spores. It differs from *M. rufula* in the same respects, and from *M. intricata* by possessing much larger parts.

26. **Microthyriella distincta** Stevens and Manter, n. sp. (fig. 63).—Thyriothecia epiphyllous, gregarious, entirely flat, up to 1.5 mm. in diameter, brown, non-carbonaceous, not always circular but

often irregular in outline, covering membrane pseudo-parenchymatous, hymenium single, no ostiole; asci many, elongate, subcylindrical, ellipsoid, blunt at both ends, aparaphysate, 8-spored, 50–75 × 20–25 μ; spores colorless, 2-celled, ellipsoid, not or little constricted, not parallel, 12–13 × 5–6 μ.

On unknown host, British Guiana: Kartabo, July 24, *675*.

The spores of this species are very small in relation to the size of the ascus. This proportion separates it from all other species in the genus.

PLOCHMOPELTINEAE

The Plochmopeltineae Theiss. (**18**) are separated from the other subfamilies of the Hemisphaeriaceae by possessing thyriothecial membranes of meandering, sinuous context, and also by possessing a free mycelium without hyphopodia. The thyriothecia are brown, although this character is not given in the subfamily description. Only a few genera are known. No representatives with mature spores were found in the present studies. MENDOZA, however, working at the University of Illinois, has described two new genera and a few new species in this group. These genera and species are included here, although a part of the material was collected in Hawaii. The descriptions of these forms are as given by MENDOZA, and the key to the genera is modified by him from THEISSEN and SYDOW.

Covering membrane without ostiole, paraphyses lacking
- Spores 2-celled, hyaline
  - Covering membrane without setae ..... *Plochmopeltis* Theiss.
  - Covering membrane with setae ..... *Plochmopeltidella* Mendoza

Covering membrane ostiolate, hymenium with many asci
- Spores 2-celled, hyaline
  - Covering membrane without setae
    - Paraphyses present ..... *Stomiopeltis* Theiss.
    - Paraphyses absent ..... *Stomiopeltella* Theiss.
  - Covering membrane with setae ..... *Chaetopeltopsis* Theiss.
- Spores 4-celled, hyaline
  - Covering membrane without setae
    - Paraphyses present ..... *Scolecopeltidella* Mendoza

Plochmopeltidella Mendoza, n. gen.

Mycelium netlike, interwoven, with long cylindrical cells; thyriothecia without ostiole, covering membrane a winding prosenchyma, setose, with many asci, aparaphysate; spores hyaline, 1-septate.

27. **Plochmopeltidella smilacina** Mendoza, n. sp. (figs. 64–66).—Mycelium of a netlike weft, interwoven, with long cylindrical cells, straw colored to almost brown, branching, without hyphopodia; thyriothecia covered by a winding prosenchyma, without ostiole, setose, about 120 μ in diameter; setae few, acute, black, about 130 μ long and 9 μ wide near base, borne on thyriothecia and outgrowths from the long cylindrical cells; asci numerous, sickle-shaped to clavate, 8-spored, about 36×12 μ; spores more or less fusiform, hyaline, 1-septate, about 15×4 μ.

On *Smilax* sp., Oahu: Olympus, June 6, *670*.

The characters of this fungus show it to be nearly related to *Plochmopeltis* Theiss., except in the presence of setae, which are not found in *Plochmopeltis*. Such difference is sufficient to warrant the erection of a new genus. The fungus is also associated with several other fungi, among them *Phragmocapnias smilacina*.

Stomiopeltis Theiss., Broteria **12**:82. 1914

28. **Stomiopeltis cassiae** Mendoza, n. sp. (figs. 67, 68).—Mycelium irregularly branched, woven to weftlike, hyaline to honey-yellow; thyriothecia numerous, dimidiate, covering cells long, irregularly woven, yellowish to brown, ostiolate, about 100 μ in diameter; ostiole with definite border, about 7 μ in diameter; asci numerous, ovate, aparaphysate, 8-spored, about 36×9 μ; spores ovate, hyaline, 1-septate, about 13×3 μ.

On *Cassia* sp., British Guiana: Tumatumari, July 10, *115*.

This fungus is found in pure growth on the leaf, and appears as a leathery, thin, sooty mass on the upper surface. The colonies have no definite shape, and are more or less irregularly scattered, although they sometimes cover the whole surface. It is strictly epiphyllous.

Stomiopeltis aspersa (Berk.) Theiss., formerly called *Asterina aspersa*, and *Stomiopeltis rubi* (Fuck.) Petr., formerly called *Asterella rubi* (Fuck.) v. Höhn., are the only other species in this genus.

Stomiopeltella Theiss., Broteria **12**:85. 1914

29. **Stomiopeltella suttoniae** Mendoza, n. sp. (figs. 69–72).—Mycelium irregularly branched, gelatinous, honey-yellow to dark brown; thyriothecia numerous, dimidiate, covering cells long, irregularly woven and interwoven, with long cylindrical cells, yellowish to dark brown, ostiolate, gelatinous, about 120 μ in diameter; asci nu-

merous, ovate, aparaphysate, 8-spored, about 44×16 μ; spores ovate, hyaline, 1-septate, about 14×5 μ.

On *Suttonia lessertiana*, Oahu: Honolulu, Hamakua upper ditch trail, July 28, *1032*.

This fungus appears to agree fully with *Stomiopeltella*, of which *S. patagonica* (Speg.) Theiss. (formerly called *Microthyrium patagonica*) is the type species. It differs from the type species in having ovate instead of elongate asci and in wider spores. It differs from *S. nubecula* (B. and C.) Theiss. (the only other species in the genus) by having much smaller asci, which are ovate instead of cylindrical.

Scolecopeltidella Mendoza, n. gen.

Mycelium netlike, branching, hyaline; thyriothecia hemispherical, membranous, ostiolate, honey-yellow; asci 8-spored, paraphysate; spores hyaline, cylindrical, 3-septate.

30. **Scolecopeltidella palmarum** Mendoza, n. sp. (fig. 73–75). —Mycelium netlike, irregularly branched, hyaline to very pale straw-colored, radiating irregularly from the thyriothecia; thyriothecia membranous, honey-yellow, ostiolate, with indefinite border, about 168 μ in diameter; asci numerous, ovate, paraphysate, 8-spored, about 36×12 μ; paraphyses numerous, thready, spores hyaline, long-cylindrical, 3-septate, about 19×4 μ.

On palm, British Guiana: Rockstone, July 17, *442*.

This fungus resembles *Scolecopeltis* in the general shape of the thyriothecia, the presence of an ostiole, and the shape and septation of the spores. It differs from *Scolecopeltis* in that it has paraphyses, 4-celled spores, a true superficial mycelium, and honey-yellow color. *Scolecopeltis* has many celled spores, blue-green thyriothecia, no true mycelium, and no paraphyses. The fungus appears as yellowish to almost brown specks, thinly scattered on both surfaces of the leaf. The thyriothecia are rare.

University of Illinois
Urbana, Ill.

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EXPLANATION OF PLATES XVIII–XXI

Plate IV was copied from figures by Mr. JOSE MENDOZA; all other drawings were made by the aid of a camera lucida by MR. MANTER.

PLATE XVIII

FIG 1.—Leaf showing characteristic appearance of thyriothecia of fungus (*Micropeltella constricta*).

FIG. 2.—Enlarged portion of same.

FIG. 3.—Thyriothecia of *Dictyothyriella vismiae* on *Coccoloba* leaf.

FIG. 4.—General appearance of thyriothecia of Dictyopeltineae.
FIG. 5.—Portion of border of same enlarged to show netlike structure.
FIG. 6.—Thyriothecium of *Theciopeltis guianensis*.
FIG. 7.—Portion of border of same.

PLATE XIX

FIG. 8.—Asci and ascospores of *Dictyothyrium disporum*.
FIG. 9.—Asci and ascospores of *Dictyothyrium leucopterum*.
FIGS. 10–13.—*Dictyothyriella guianensis;* asci and ascospores, showing variation.
FIGS. 14–17.—Asci and ascospores of *Dictyothyriella heterosperma*, showing variation in number of spores.
FIGS. 18–22.—Asci and ascospores of *Dictyothyriella heterosperma* from single perithecium, showing great variability of spores.
FIG. 23.—Asci and ascospores of *Dictyothyriella heterosperma* from different host.
FIGS. 24–26.—Asci and ascospores of *Dictyothyriella philodendri*.
FIGS. 27–29.—*Dictyothyriella vismiae*; asci and ascospores.
FIG. 30.—Asci and ascospores of *Micropeltis tetraspora*.
FIG. 31.—Ascus, ascospores, and paraphyses of *Micropeltis dispora*.
FIG. 32.—Ascospores of same.
FIG. 33.—Ascus of same with spores.
FIGS. 34, 35.—Asci and ascospores of *Micropeltis aroidicola*.
FIG. 36.—*Micropeltis guianensis;* asci, paraphyses, and ascospores.

PLATE XX

FIG. 37.—Ascus and spores of *Micropeltis rhopaloides*.
FIG. 38.—Asci and spores of *Micropeltis dissociabilis*.
FIG. 39.—Asci and spores of *Micropeltella minima*.
FIG. 40.—Ascus and spores of *Micropeltella constricta*.
FIGS. 41, 42.—Asci and spores of same fungus from different host.
FIGS. 43, 44.—Asci and spores of *Micropeltella sparsa*.
FIGS. 45, 46.—Asci of *Scolecopeltidium hormosporum*, showing ascospores.
FIGS. 47–49.—Spores of *Scolecopeltidium mirabile*.
FIG. 50.—Spores of same in portion of ascus, showing position within ascus.
FIGS. 51–53.—Asci and spores of *Scolecopeltidium multiseptatum*.
FIG. 54.—Ascus and spores of *Scolecopeltidium liciniae*.
FIGS. 55–57.—Outline of ostioles of different thyriothecia on same leaf, showing variation (*Dictyothyriella vismiae*).
FIG. 58.—Asci of *Scolecopeltidium costi*, showing spores in very early stage of development.
FIG. 59.—Asci of same fungus showing spores at different stages of development.
FIG. 60.—Mature spores of *Scolecopeltidium costi*.

FIG. 61.—Ascospores of *Theciopeltis guianensis*.

FIG. 62.—Asci and spores of *Microthyriella guianensis*.

FIG. 63.—Asci and spores of *Microthyriella distincta*.

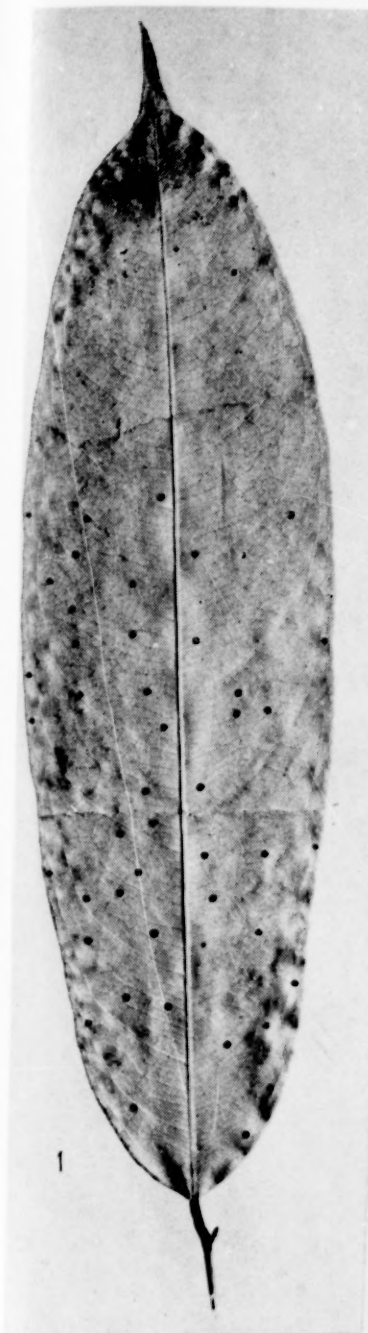
PLATE XXI

FIGS. 64–66.—*Plochmopeltidella smilacina:* fig. 64, thyriothecium showing character of covering membrane and portion of setae; fig. 65, two asci with ascospores; fig. 66, three ascospores showing sickle-shape to clavate form.

FIGS. 67–68.—*Stomiopeltis cassiae:* fig. 67, thyriothecium showing ostiole and asci with ascospores; fig. 68, ascus with ascospores.

FIGS. 69–72.—*Stomiopeltella suttoniae:* fig. 69, portion of mycelium showing character of cells; fig. 70, thyriothecium showing ostiole and character of covering membrane; fig. 71, ascus with ascospores and paraphysis; fig. 72, two ascospores.

FIGS. 73–75.—*Scolecopeltidella palmarum:* fig. 73, thyriothecium showing ostiole and character of covering membrane and cells of mycelium; fig. 74, ascus with ascospores and paraphyses; fig. 75, two ascospores.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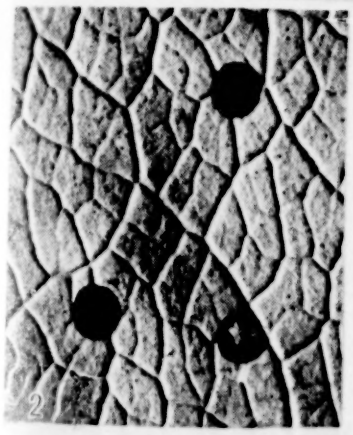
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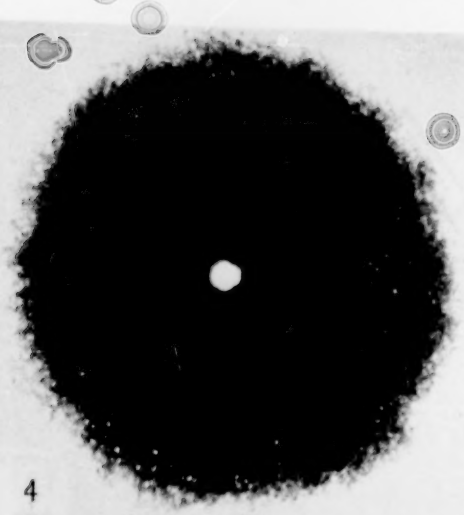
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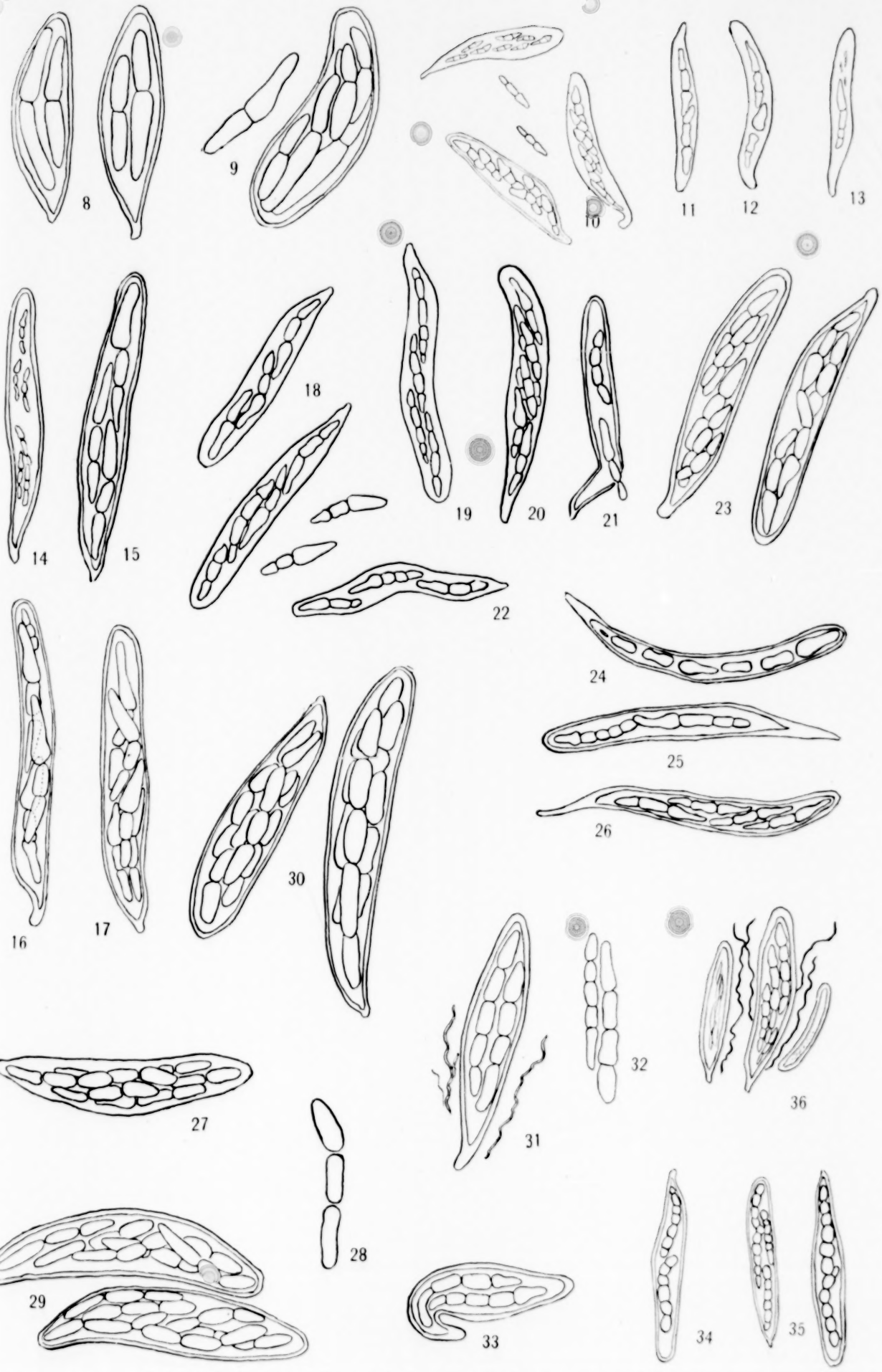
STEVENS and MANTER on HEMISPHAERIACEAE



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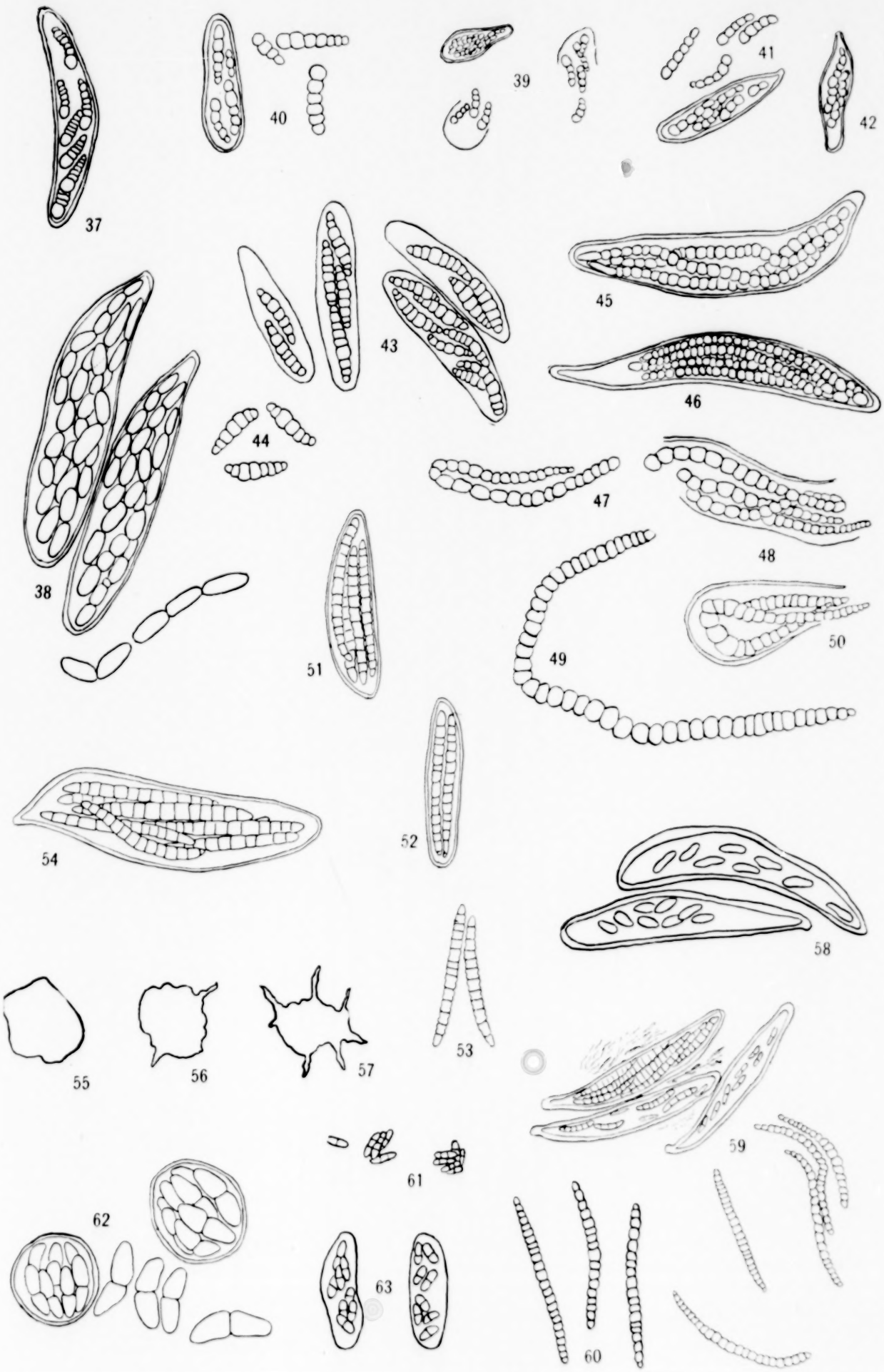

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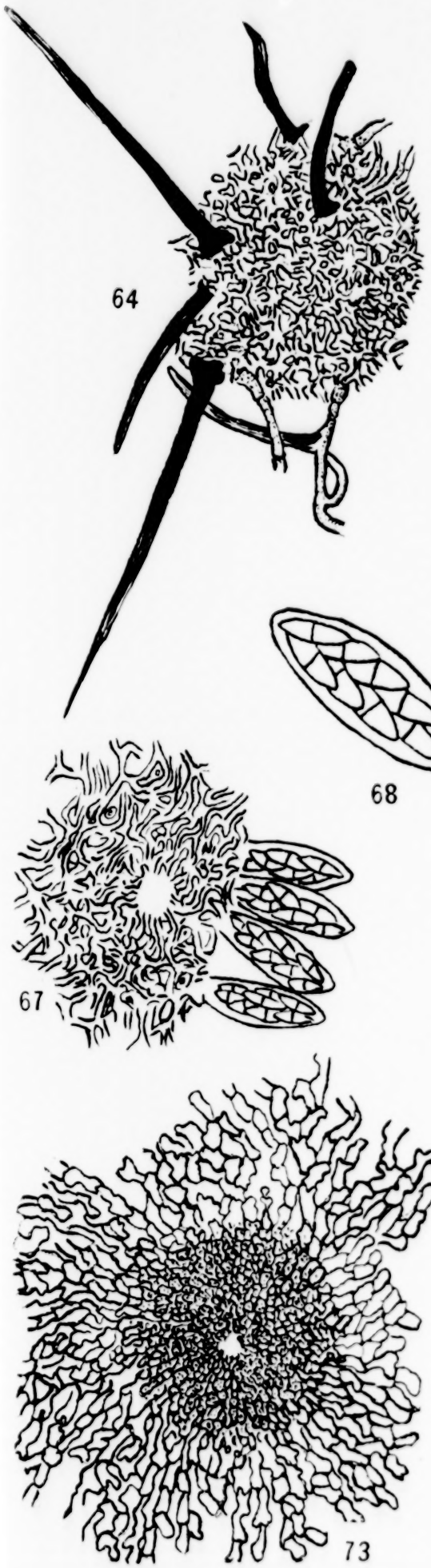

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